APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/399,678	09/21/1999	DUANE L. ABBEY	98CR023/KE	2540

7590   07/22/2003

ATTENTION: KYLE EPPELE
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EXAMINER
MUNOZ, GUILLERMO

ART UNIT	PAPER NUMBER
2634	

DATE MAILED: 07/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-12 and 26-30* is/are allowed.

6)☒ Claim(s) *13,14 and 16-25* is/are rejected.

7)☒ Claim(s) *15* is/are objected to..

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 September 1999* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

Applicant's arguments filed on April 28, 2003, regarding claims 13, 16, 20, and 22 and all claims dependent thereon, have been fully considered but they are not persuasive.

Applicant's argument—Examiner fails to establish a prima facie case due to the reference Gao "A Partial-Polyphase VLSI Architecture for Very High Speed CIC Decimation Filters" not having a public disclosure date prior to applicants priority date.

Examiner's response—The Gao reference was publicly disclosed at the Twelfth Annual IEEE International ASIC/SOC Conference, 1999. Held on the dates September 15-18, 1999, as shown on IEEE Xplore Citation.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 13, 14, and 16-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Yang et al ("High Speed Polyphase CIC Decimation Filter", Circuits and Systems, 12-15

May 1996. ISCAS '96, 'Connecting the World', 1996 IEEE International Symposium, VOL.

2, pages 229-232) in view of Hogenauer, Eugene B. ("An Economical Class of Digital Filters

for Decimation and Interpolation", April 1981. IEEE Transactions on Acoustics, Speech,

and Signal Processing. VOL. ASSP-29, NO. 2) and Gao et al ("A Partial-Polyphase VLSI

Architecture for Very High Speed CIC Decimation Filters", 1999. Proceedings. Twelfth

Annual IEEE International, 1999, Pages 391-395).

In regards to claims 13 and 20; as applied to claim 1 above, Yang teaches a polyphase

CIC filter wherein:

- "Instead of using one CIC filter to decimate the high speed digital signal, here we use two

  (one N_1-stage and one N_2-stage). The downconversion factors for them are R_1 and R_2,

  respectively. Here we assume that R can be factored as R_1 * R_2"(page 230, col.3).

- "Where $F_i(z)$ are polyphase components, operating at the rate of f_s/R_1. Thus the

  polyphase structure for CIC decimation filters can be built as shown in Fig. 2"(page 230,

  col.4, Fig.2).

Yang teaches that the polyphase components $F_i(z)$ operate at a downconverted rate

f_s/R_1. R_1 is equivalent to claimed data rate change component establishing the data rate

input to the integrator structure. Yang, also, teaches that $R=R_1*R_2$. Yang, however, fails

to teach that the CIC decimator filter outputs data equivalent to a post-decimated

integrator filter.

Gao et al teaches a partial polyphase CIC decimator filter wherein:

- "filters can operate at much lower sampling rate meanwhile achieve the same

  performance as Hogenauer's CIC filters"(page 392, col.3).

Therefore, it would have been obvious to one having ordinary skill in the art at the

time the invention was made to downconvert the sample rate f_s of Yang prior to input into

the integrator stage in view of Gao for the purpose of operating at a lower sampling rate.

In regards to claim 14; as applied to claim 13 above, Hogenauer teaches a CIC filter

wherein:

- "The integrator section of CIC filters consists of N ideal digital integrator stages operating at the high sampling rate, f_s"(page 155, col.2).

  The N ideal digital integrator stages are equivalent to claimed cascaded integrator structure comprises a plurality of integrator stages in claim 14.

  In regards to claims 16 and 22; as applied to claims 13 and 22, respectively, Gao teaches a partially polyphase CIC decimator filter wherein:

- "From Table II it's clearly seen that the polyphase decomposition is simple when filter order k and decimation ratio N_{pp} are low"(page 393, col.6).

  Polyphase decomposition is equivalent to claimed serial to parallel conversion in claim 16 and claimed converting a received serial data stream to a parallel signal having a plurality of parallel paths in claim 22, lines 2-3.

  In regards to claims 17, 18, 23, and 24; as applied to claims 13 and 20, Yang teaches a CIC decimator filter wherein:

- "Since there are finite combinations for the polyphase components' output, a look-up table ROM can be used to store all the possible results which will be addressed by bandpass $\Delta\Sigma$ modulator's outputs "(page 231, col.5).

  The ROM look-up table is equivalent to claimed read only memory device in claim 17; claimed look-up table which stores coefficients for modifying data received from data rate change component in claim 18; and claimed accessing a memory device in claim 24, line 2. The results stored in the look-up table ROM are equivalent to claimed coefficients used to modify the received data by multiplication in claim 23 and claimed data held by

said memory device being used during step to modify data received from said data rate

change component.

In regards to claims 19 and 21; as applied to claims 13 and 20, respectively, Yang teaches

a polyphase CIC decimator filter wherein:

- "where $F_i(z)$ are polyphase components"(page 230, col.4, Fig.2)

    The multiple $F_1(Z)$ paths are equivalent to claimed plurality of reduced rate parallel

signal paths with an integrator stage and a plurality of coefficient multipliers for each

path in claim 19 and processing received data with a plurality of parallel integrator stages

in claim 21.

In regards to claim 25; as applied to claim 20 above, Yang teaches a polyphase CIC

decimator filter wherein:

- "the polyphase structure for CIC decimation filters can be built as shown in Fig.2"(page

    230, col.4).

    Figure 2 of the polyphase structure includes a combining stage immediately following

the plurality of integration paths. The combing stage is equivalent to claimed combining

procedure further modifying data received at the changed data rate in claim 25.

Claim Objections

Claim 15 are objected to as being dependent upon a rejected base claim, but would

be allowable if rewritten in independent form including all of the limitations of the base

claim and any intervening claims.

Allowable Subject Matter

The following is an examiner's statement of reasons for allowance:

Claims 1-12 and 26-30 are considered allowable because the present invention comprises a

recursive cascaded integrator-comb digital filter having a first rate change component located

between the cascaded integrator structure and the cascaded comb structure. The filter, further,

comprises a second rate change component located with the cascaded comb structure. The closes

prior art, Hogenauer "An Economical Class of Digital Filters for Decimation" shows a similar

circuit including a cascaded integrator-comb filter with a rate changer between the cascaded

integrator structure and the cascaded comb structure. However, Tan et al fails to teach a cascaded

integrator-comb digital filter having cascaded comb digital filter with a rate converter. This

distinct feature has been included in independent claims 1 and 26 rendering it allowable.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time
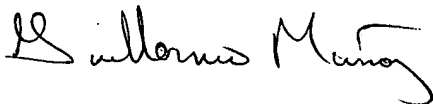
policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing

date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Guillermo Munoz whose telephone number is 703-305-4224.

The examiner can normally be reached on Monday-Friday 8:30a.m-4:30p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone numbers for the

organization where this application or proceeding is assigned are 703-872-9313 for regular

communications and 703-872-9313 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is 703-306-0377.

GM
July 11, 2003

STEPHEN CHIN
SUPERVISORY PATENT EXAMINEF
TECHNOLOGY CENTER 2600